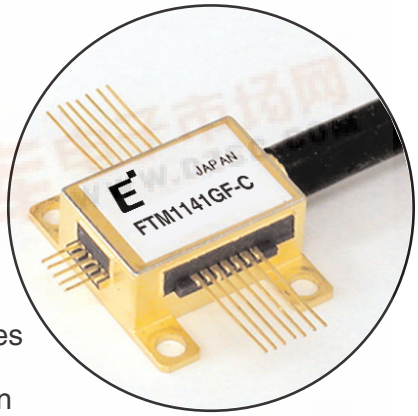
Driver Integrated 10Gb/s MI-DFB LD Module

FTM1141GF-C

FEATURES

- Driver integrated 10Gb/s MI-DFB module for 1600ps/nm optical transmission
- MI-DFB-LD (Modulator Integrated DFB Laser Diode) is installed
- Modulator driver IC is installed
- Built-in optical isolator, PIN-Photo diode for monitor, thermistor and thermo-electric cooler
- 1600ps/nm (80km)



DESCRIPTION

The FTM1141GF-C was developed to reduce the size and technical complexity of 10Gb/s optical board designs. This product, which includes a driver and modulator integrated laser in one package, eliminates the customer concerns regarding how to handle the RF interfacing between these two components on his board. By co-packaging these components a solution has also been achieved that offers greatly reduced board space. This reduction in space is critical for next generation transponder applications. The FTM1141GF-C has been designed with a differential co-planar electrical interface which allows for easy interfacing to RF lines on PC boards. The package and pinout are part of a multi-source agreement. This product is designed for 80km SONET/SDH applications and single channel drop links in DWDM systems.

ABSOLUTE MAXIMUM RATINGS (Top=25°C, Unless otherwise specified)

Parameter	Symbol	Condition	Limits		Unit
			Min.	Max.	
Storage Temperature	T_{stg}		-40	85	°C
Operating Case Temperature	$T_{op(Tc)}$		0	75	°C
Optical Output Power	Pf	CW	-	5	mW
Laser Forward Current	If	CW	-	150	mA
Laser Reverse Voltage	VR	CW	-	2	V
Power Supply Voltage	V_{SS}		-6.5	0	V
Modulator (Mod) Modulation Control Voltage	Vm		-6.5	V_{SS}+1.2 (max0)	V
Mod Bias Control Voltage	V_b		-6.5	V_{SS}+2.4 (max0)	V
Cross Point Control Voltage	Vx1,(Vx2)		V_{SS}-4.8 (min-6.5)	V_{SS}+2.4 (max0)	V
Data Input Voltage	Din, DinB	Differential (AC-coupled)	-	1.6	Vpp
ESD Tolerance	Vesd	Note (1-1)	-	50	V
ESD Tolerance	Vesd	Note (1-2)	-	200	V
Photodiode Forward Current	-		-	1	mA
Photodiode Reverse Voltage	VDR		-	10	V
TEC Voltage	Vc	Cooling	-	2.5	V
		Heating	-1.0	-	
TEC Current	Ic	Cooling	-	1.5	A
		Heating	-0.5	-	
Thermistor Temperature	Tth	ATC operation	0	+75	°C
Lead Soldering Time	-	260°C MAX	-	10	sec

OPTICAL SPECIFICATIONS (T_{LD}=25°C, T_{op}=0 to 75°C and BOL, unless otherwise specified)

LASER DIODE AND MODULATOR CHARACTERSITICS

Parameter	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Threshold Current	Ith	CW	-	-	25	mA
Operating Current	Iop	Pf=Pop	40	70	100	mA
Optical Output Power	Pop	Note (2a)	+1.0	-	+3.5	dBm
Forward Voltage	VF	CW, I_F=I_{op}	-	1.4	2.2	V
Extinction Ratio	Rext	Pf=Pop, Note (2a)	9.0	-	-	dB
Peak Wavelength	Wp	Pf=Pop, Note (2a)	1530	-	1565	nm
Side Mode Suppresion Ratio	SSR	I_F=Pop, CW	35	-	-	dB
Optical Rise Time	Tr	Note (3), 20% to 80%	-	-	30	psec
Optical Fall Time	Tf	Note (3), 20% to 80%	-	-	30	psec
Optical Isolation	Is		25	-	-	dB
Tracking Error	TE	Note (2a)	-0.5	-	+0.5	dB
Input Return Loss	S11	130KHz to 10GHz	6	-	-	dB
Dispersion Penalty	dP	Note (2)	-	-	2.0	dB
Eye Pattern Mask	Msk	Note (2a), 500 counts	Error Free			-

MONITOR DIODE CHARACTERISTICS

Parameter	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Monitor Current	Im	I_F=I_{op}, VDR=5V	100	-	1500	μA
Monitor Dark Current	Id	VDR=5V	-	2	100	nA
Monitor Diode Capacitance	Ct	VDR=5V, f=1MHz	-	5	15	pF

TEC & THERMISTOR CHARACTERISTICS

Parameter	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
TEC Current	Ic	Note (4)	-	-	1.0	A
TEC Voltage	Vc	Note (4)	-	-	2.0	V
TEC Power Consumption	Pc	Note (4)	-	-	2.0	W
Thermistor Resistance	Rth	TLD=25°C	-	10	-	kΩ
Thermistor B Constant	B	25/75°C	3270	3450	3630	K

DRIVER IC CHARACTERISTICS

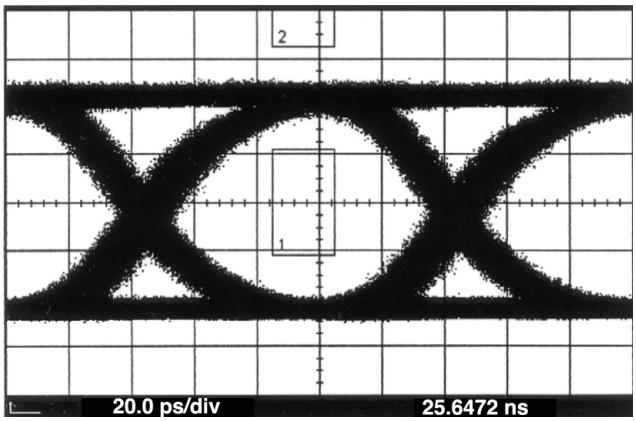
Parameter	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Driver IC Supply Voltage	Vss		-5.5	-5.2	-4.9	V
Driver IC Supply Current	Iss		-	-	285	mA
Modulator (Mod) Modulation Control Voltage	Vm		V_{ss}	-	V_{ss} +1.0	V
Mod Bias Control Voltage	Vb		V_{ss}	-	V_{ss} +2.2	V
Cross Point (XP) Control Voltage	Vx1, (Vx2)	Xp=50%	V_{ss} +0.8	-	V_{ss} +2.2	V
Data Input Voltage	Din, DinB	Differential (AC Coupled)	0.5	-	1.0	Vpp

Note (1-1): Pin No. 3,4,5,6,7,9,11 (Human Body Model)
Note (1-2): Pin No. 1,2,8,10,12-19 (Human Body Model)
Note (2): Eudyna Test System
(a) Drive Condition
Bit Rate: 9.95328 Gb/s
Word Pattern: PRBS=2^{31}-1
Mark Density: 50%
Laser Bias Current: I_{op}
Laser Temperature(TLD): 25°C
Eye Pattern Mask: ITU-T Eye mask for STM-64
(b) Fiber Dispersion
1600ps/nm
(c) Dispersion Penalty
Bit Error Rate=10^{-12}

Note (3): Eudyna Test System
Vb, Vm, Vx1(Vx2) is set to make Pop and Rext within the specification

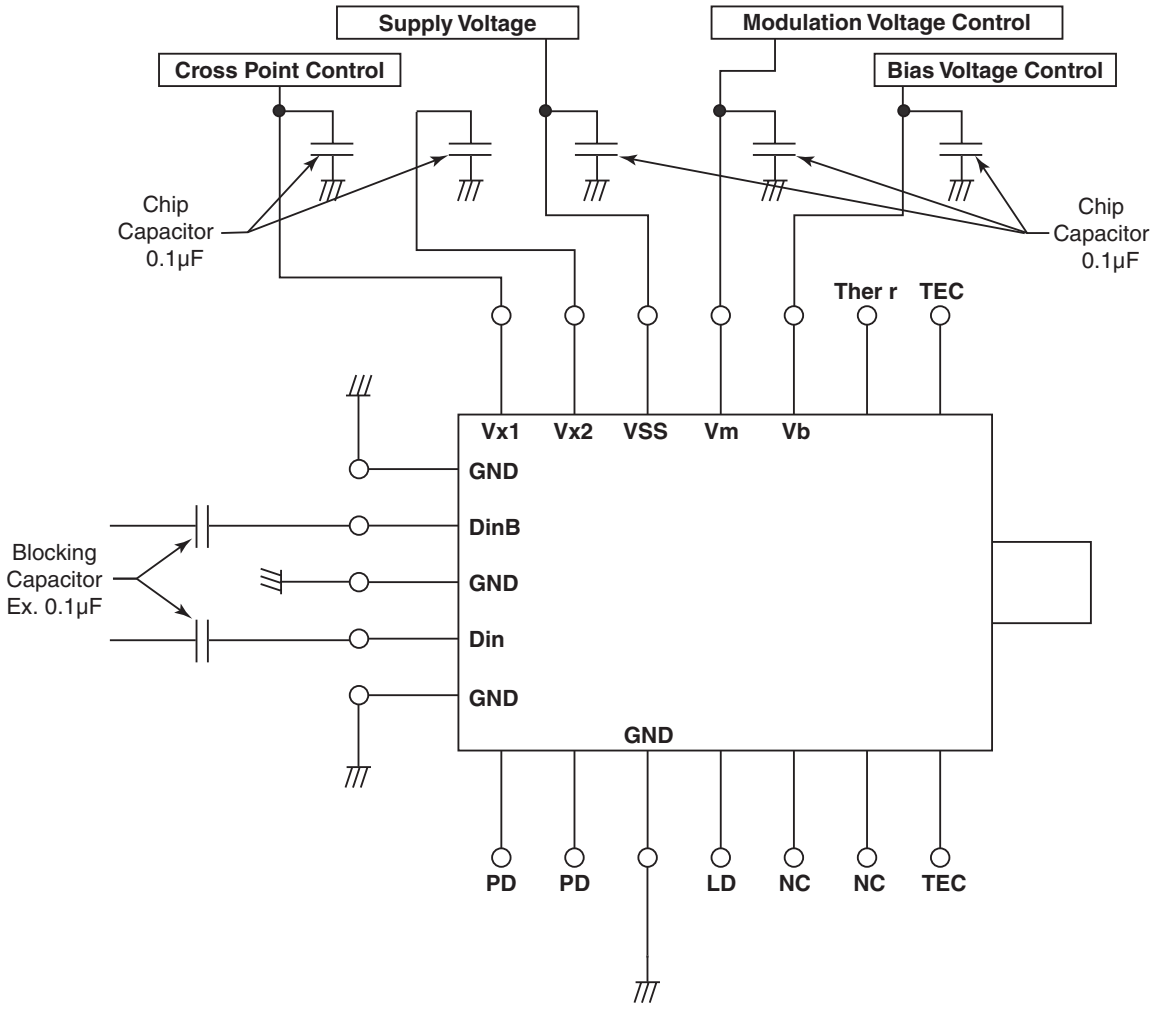
Note (4): Eudyna Test System
Operating Case Temperature: T_{op}=+75°C
Laser Temperature: 25°C
Optical Output Power: Pf=Pop, Note (2a)

Typical Output Waveform
Back to Back (with Filter)



9.95328Gb/s, NRZ, PRBS=2^{31}-1, TLD=TC=25°C

Typical Application for Driver IC



For stable operation:

8-1. To prevent a dependence of “Cross point” on the supply voltage VSS,
(1) Use an external voltage source of -3.8V for “Vx2”, or
(2) Control the voltage of “Vx1”, so that the voltage difference “Vx1-Vx2” remain constant.

8-2. To prevent a dependence of “Modulation control voltage” on the supply voltage VSS, control the voltage of “Vm”, so that the difference “Vm-VSS” remain constant.

8-3. To prevent a dependence of “Bias control voltage” on the supply voltage VSS, control the voltage of “Vb”, so that the difference “Vb-VSS” remain constant.

Driver Integrated 10Gb/s MI-DFB LD Module

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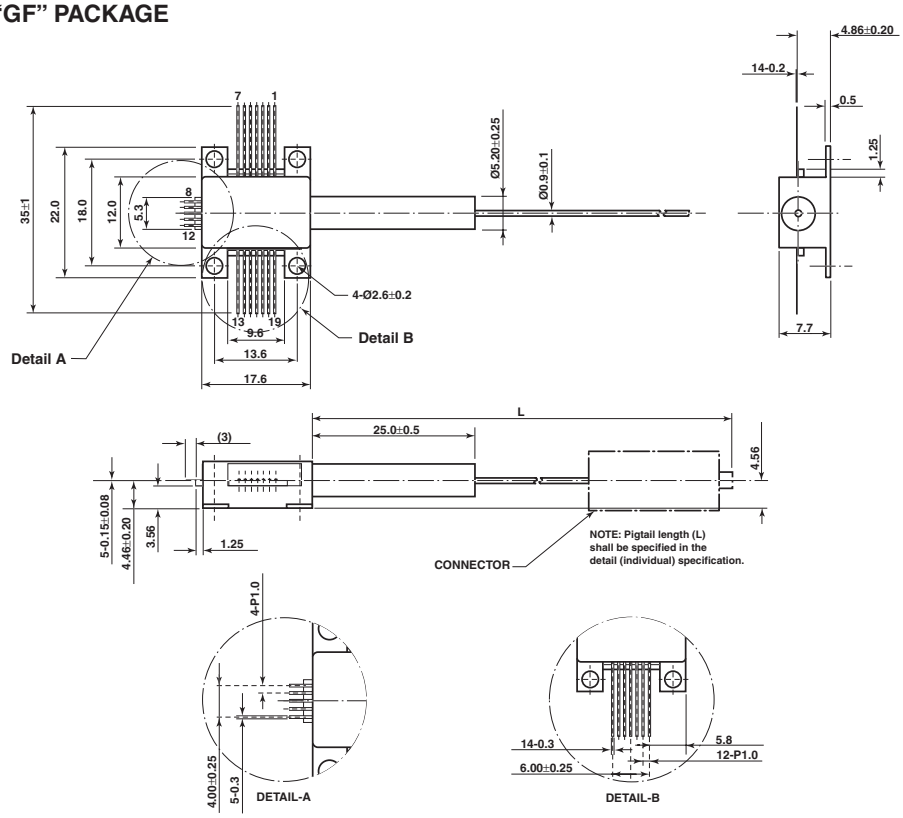
"GF" PACKAGE

UNIT: mm



Pin Description
1. Thermoelectric cooler(Anode, +)
2. Thermistor
3. Vb: Modulator bias control voltage
4. Vm: Modulator modulation voltage control voltage
5. Vss: Driver IC supply voltage
6. Vx2: Cross point control voltage
7. Vx1: Cross point control voltage
8. Case Ground
9. DinB: Inverted data input voltage
10. Case Ground
11. Din: Data Input voltage
12. Case Ground
13. Monitor photo diode(Cathode)
14. Monitor photo diode(Anode)
15. Case Ground
16. LD Bias(Anode)
17. NC
18. NC
19. Thermoelectric cooler(Cathode, -)

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CAUTION

Eudyna Devices Inc. products contain **gallium arsenide (GaAs)** which can be hazardous to the human body and the environment. For safety, observe the following procedures:

- **Do not put this product into the mouth.**
- **Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.**
- **Observe government laws and company regulations when discarding this product. This product must be discarded in accordance with methods specified by applicable hazardous waste procedures.**